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RUSSIAN-CHINESE STRATEGIC SCIENTIFIC COOPERATION IN THE MODERN EMERGING MULTIPOLAR WORLD

In today’s geopolitical environment, the evolving dynamics of international relations highlight the emergence of strategic partnerships as key forces shaping global order. At the forefront of this transformation is deepening cooperation between China and Russia, a partnership that goes beyond traditional bilateral ties and creates a multifaceted alliance poised to redefine the contours of global power.

It is expected that in 2024, when China and Russia celebrate the 75th anniversary of the establishment of diplomatic relations, their cooperation will be intensified, focusing on economic interaction, solidarity in international forums and resolving regional crises. This partnership is critical to navigating the complexities of today's international politics and economics, serving as a beacon of cooperation in a rapidly changing world. This multifaceted cooperation not only serves the interests of both countries, but also contributes to global stability and development, embodying a partnership model that goes beyond traditional alliances and promotes a balanced, multipolar world order.

Sanctions imposed against Russia, coupled with turbulence in international diplomacy, have pushed Moscow and Beijing towards closer economic, military and technological cooperation. This alliance is not just a response to external pressure, but a strategic realignment towards mutual reinforcement in the face of Western hegemony. The partnership symbolizes a new era in international relations, in which science and technology become critical areas of cooperation, stimulating innovation and providing competitive advantages on the global stage. In doing so, the goal is to develop mechanisms through which China and Russia are forging a new path in international relations that not only challenges the existing global hierarchy, but also emphasizes the vital role of scientific and technological cooperation in overcoming the complexities of the modern world. This article attempts to explore the scientific landscape of the Chinese-Russian alliance in the dynamics of the emerging

multipolar world. Through this lens, we will consider the current situation and prospects for the Chinese-Russian scientific alliance as the cornerstone of a more balanced and equitable global order, where innovation and cooperation are the key to solving the most pressing problems of our time.

Analysis of the scientific results and dynamics of joint research of the BRICS countries – Brazil, Russia, India, China and South Africa – for the period from 2018 to 2024 allows us to draw key conclusions and highlight the quantitative indicators that determine these trends (data from the Scopus database as of February 23, 2024).[1] China stands out as the leading country in the BRICS consortium, with a total scientific publication output of 5,273,107 publications, representing a growth of 69.7%[2]. The country's academic community has expanded significantly over the past five years, with the total number of authors reaching 5,901,050, up 83.2% from 2018. The average number of citations per publication in China is 10.4, with the Field Weighted Citation Impact (FWCI) equal to 1.10, indicating that Chinese scientific papers are cited more often than the world average. Following China, India made significant scientific contributions, publishing 1,482,662 publications each being cited on average by 7.1 people. The FWCI for India is 0.99, slightly below the global norm. At the same time, the Russian Federation shows 731,581 publications and a modest growth rate of 7.8%[3]. The number of authors in Russia has increased by 14.1% over 5 years. Russian publications receive an average of 4.7 citations, and the FWCI citation index is 0.67, that is, the citation rate is below average. Brazil showed 10.7% growth in scientific output with an average number of citations of 8.0 per publication and FWCI of 0.88, which is below the world citation average. Interestingly, South Africa, with the lowest

[1] BRICS – Brazil, Russia, India, China, South Africa // SciVal : [website]. URL: https://www.scival.com/overview/collaboration/overall?uri=CountryGroup%2F12 (accessed on: April 27, 2023).

[2] China // SciVal : [webiste]. URL: https:// https://www.scival.com/overview/collaboration/overall?uri=Country/156 (accessed on: April 27, 2023).

[3] Russia // SciVal : [website]. URL: https:// https://www.scival.com/overview/collaboration/overall?uri=Country/643 (accessed on: April 27, 2023).

scientific output among the BRICS countries (198,255 publications), showed a significant increase in the number of publications by 28.9% with high citation rates per publication (10.3).

At the same time, international cooperation, which accounts for 21.8% of the total volume of publications of the BRICS countries, is a decisive factor stimulating highly effective scientific work, allowing for articles with 15.6 citations per publication. The FWCI index for international collaborative research is 1.63, national collaborations account for 40% of output with FWCI of 0.94, and institutional collaboration accounts for 33.3% of output with FWCI of 0.76. Single-authored papers, representing 4.8% of the scientific output, demonstrate limited impact of independent research efforts, with the lowest FWCI score of 0.5.

For Russia, international cooperation is a catalyst for increasing recognition and research productivity, while the level of citations and impact from such cooperation is noticeably higher than that of national collaborations. In particular, international collaborative efforts account for 21.9% of Russia's scientific output, which ensures a high level of citations and exceeds the world average citation rate by 39%. The cooperation between China and Russia, although not the largest compared to China's cooperation with Western countries, highlights a significant strategic alliance on the global scientific stage. Analysis based on the All Science Journal Classification (ASJC) system shows the partnership characterized by 22,112 co-authored publications during this period, representing a significant increase of 69.5%. This cooperation is not only large-scale, but also deeply effective, as evidenced by the participation of 21,012 co-authors from the Russian Federation (an increase of 79.3%) and 64,195 co-authors from China (an increase of 118.6%). The Field Weighted Citation Impact (FWCI) for this collaborative effort is impressive, namely 2.47, with an average of 25.3 citations per publication.

The areas of cooperation between Russia and China are diverse, but some disciplines stand out due to the large number of co-authored papers and the strategic importance of their research.[4] Physics and astronomy is the leading area of collaboration, with 7,498 co-authored publications. The area of "nuclear physics and high energy physics" is particularly notable, representing 1,825 co-authored publications out of the total volume of publications in Russia (11,308) and China (24,013) in this subcategory. Engineering shows a strong partnership with 4,658 co-authored papers, especially in the area of "electrical and electronic engineering", which accounts for 1,410 publications. Materials science is another major area of collaboration, with 1,855 co-authored publications in the subcategory of general materials science, making a total of 4,419 publications in this field. General chemistry leads the way with 1,475 co-authored publications out of 3,097 publications in the chemical sciences.

However, it must be taken into account that cooperation between the two countries amounts to 3% of the total scientific development of Russia and less than 1% for China, which emphasizes the asymmetric nature of the partnership. In Russia, 4.27% of authors collaborate with China, compared with 1.09% of Chinese authors working with Russian colleagues, highlighting the disparity in collaboration and pointing to a faster expansion of China's scientific base.

Within the future projections, it is also necessary to remember that China's strategic aspiration to become a global leader in science and technology (S&T) has been a defining characteristic of its policy direction since the turn of the millennium[5]. This journey began with the government implementing several initiatives aimed at stimulating innovation and accelerating the country's scientific and technological development. The adoption of the Medium and Long-Term Science and Technology Plan (2006–2020), or MLP, in 2006 was a

[4] BRICS – Brazil, Russia, India, China, South Africa // SciVal: [website]. URL: https://www.scival.com/overview/collaboration/overall?uri=CountryGroup%2F12 (accessed on: April 27, 2023).

[5] Sun Y. Planning for science: China's "grand experiment" and global implications / Y. Sun, C. Cao // Humanit Soc Sci Commun – 2021. – T. 8 – No. 1.

key step towards making China an “innovation-driven society” by 2020, with the main goal of becoming a global leader in science and technology by 2050. The MLP program was aimed at promoting commercial innovation, meeting society's needs through technology, strengthening national defense, and improving the quality of research to retain homegrown talents.

China's science and technology growth has been characterized by strong government leadership, significant investment in research and development (R&D), and a focus on sectors such as artificial intelligence, biotechnology, and renewable energy. The Made in China 2025 initiative highlights China's transition to high-end manufacturing, aiming to achieve significant self-sufficiency in core components by 2025[6].

At the same time, despite the progress made and participation in international cooperation, there are shill some issues in China, such as the need for greater creativity and innovation in research, integrity and ethical standards in technology. Initiatives such as the Thousand Talents Program aimed to counteract brain drain by attracting expatriate scientists and professionals to contribute domestically. However, challenges remain, including a shortage of top talent and inconsistencies surrounding recruitment strategies. The departure of leading scientists from the country compounds the challenge of building an innovation-focused nation, potentially undermining the goals of the MLP. Despite the prestige and benefits of the TTP, it did not fully achieve its goals as many participants did not return to China after their studies. This situation has been exacerbated by international controversy and increased control, especially by the US government. China's recent suspension of U.S. talent recruitment programs and difficulties in sending students and scientists abroad, especially those in high-tech fields, pose significant risks to its technological advancement efforts.

[6] Ibid

It should be noted that the phenomenon of “brain drain” versus “brain circulation” is a global problem, and countries are striving to balance the inflow and outflow of talent. Emphasizing transparency, research integrity, ethics and intellectual property protection when recruiting talent overseas is paramount to prevent the phenomenon of “double dipping”, where people benefit from multiple sources without being employed full-time. Moreover, keeping overseas-educated Chinese students in their countries of studies, especially highly talented ones, highlights the difficulty of international cooperation. Though such collaboration is critical, it requires careful institutional arrangements to prevent conflicts of interest and ensure commitment, highlighting the delicate balance between global participation and national development goals.

Since 2019, China has been developing a new medium- and long-term plan (MLP) for the period 2021–2035[7]. Although the details of this plan have not yet been disclosed, the general provisions of the 14th Five-Year Plan (2021–2025) for national economic and social development and the long-term outlook up to 2035 provide insight into its direction and potential impact on China's science and technology landscape[8]. This upcoming plan reaffirms China's commitment to innovation as the core of its modernization and development strategy.

The 14th Five-Year Plan highlights self-reliance in the scientific and technological sphere as the basis of national development and modernization. It posits the key role of S&T, self-reliance and self-improvement (*zili ziqiang*) as fundamental elements of national development and outlines China's ambition to become a world leader in innovation by 2035 by building the country's strategic scientific and technological capabilities, enhancing enterprises' capabilities in

[7] Poo M. Innovation and reform: China’s 14th Five-Year Plan unfolds / M. Poo // Natl Sci Rev – 2020. – V. 8 – No. 1 – nwaa294c.

[8] Sun Y. Planning for science: China’s “grand experiment” and global implications / Y. Sun, C. Cao // Humanit Soc Sci Commun – 2021. – V. 8 – No. 1 – 1–9p.10, No. 1–2. P. 93.

technological innovations, development of the innovative potential of talented specialists and improvement of institutions for the implementation of scientific and technical innovations.

Based on this, there is an urgent need to develop detailed plans for the development of collaboration with China, taking into account S&T programs, which will add additional significance to this cooperation for the Chinese side.

One of the areas to strengthen cooperation between scientists from the Russian Federation and China is to increase the competitions held by the Russian Foundation for Basic Research, the Russian Science Foundation and the State Natural Science Foundation of China (NSFC), which are characterized by a multiple increase in the number of applications over the past three years. These grants, in addition to solving the assigned scientific and technical problems, also form the basis for further expansion of cooperation, including through the creation of joint research centers. In this vein, we can mention, as an example, our creation by us in 2020 of the Joint Russian-Chinese Center for Systemic Pathology on the basis of the Federal State Autonomous Educational Institution of Higher Education “South Ural State University (Research University)” (Chelyabinsk, Russia). Initially, the development plans for the center included the creation of three mirror laboratories (in Russia and China) together with representatives of the Ural Branch of the Russian Academy of Sciences and the expansion of the range of interaction from scientific research to the implementation of educational programs in the field of higher education. However, despite the successful launch and staffing with highly qualified personnel, the lack of ongoing targeted funding, direct support from ministries, and changed funding conditions for the university forced a significant reduction in the center’s activities to one laboratory. Undoubtedly, despite the impressive indicators (more than 15 articles were published in high-impact journals and one international project was completed, a cooperation agreement was signed between Wuhan University (China) and SUSU (National Research University)),

almost stopped activities of the center not only prevented the implementation of ambitious joint plans, but also quite surprised the Chinese side, which was accustomed to relying on long-term planning and support from the state.

In this regard, the proposal to create a specialized department at the Russian Academy of Sciences aimed at promoting cooperation with China through the coordination of research, the creation of project and research databases, the creation of parallel or mirror laboratories (inter alia in third countries to reduce geopolitical risks and sanctions pressure), is based on several strategic considerations. First, this initiative recognizes the growing global importance of Chinese-Russian scientific and technological cooperation, which promises to yield significant dividends in innovation, economic development and geopolitical influence. Also, collaborative efforts and synergistic pooling of resources, expertise, and infrastructure can accelerate research and development, spurring innovation that may not be achievable alone. This synergy is particularly relevant in sectors such as information technology, biotechnology, renewable energy and space exploration, where both countries seek to carve out a niche independent of Western technological paradigms. Finally, the institutionalization of cooperation will give additional incentive to Chinese partners to consider it as a permanent and active factor.

In a changing geopolitical landscape, strengthened Chinese-Russian scientific cooperation can serve as a basis for expanding strategic partnership. This enhanced cooperation plays an important role in strengthening mutual trust and understanding, laying a strong foundation for confronting common challenges and defending common interests in the international arena. By combining their scientific achievements, Russia and China can make significant contributions to global solutions, thereby raising their status as responsible global players aimed at overcoming common human problems.

The creation of a dedicated department could also pave the way for cultural and educational exchanges between the scientific communities of both

countries, promoting not only research collaboration but also strengthening long-term ties between future generations of scientists. The establishment of parallel/mirror laboratories could leverage the complementary strengths of both countries to create cutting-edge research centers, attract world-class talent, and further improve the scientific foresight of both countries.

In general, in the context of a changing global landscape, the growing Chinese-Russian partnership goes beyond traditional geopolitical alliances, embodying the potential of joint scientific and technological developments to solve the problems of the 21st century. By leveraging each country's strengths and capabilities, this partnership promises to promote sustainable development, technological innovation and geopolitical balance. As the world faces unprecedented challenges, strategic cooperation between China and Russia illustrates the urgent need for joint efforts to create a balanced, multipolar world order, thereby paving the way for a more inclusive, sustainable and prosperous global community.

Despite the fact that each civilization has its own unique cultural code, today we live in a global information space dominated by the English language, which puts the world under the influence of the Anglo-Saxon information paradigm. At the same time, China stands out as a special civilization characterized by a value-semantic structure and a unique rationality that seeks a middle path. It is this aspiration that is a symbol of China's self-description as the Middle Kingdom, emphasizing the principle of harmonious coexistence of its diverse population. In this vein, in order to ensure a harmonious existence, individual countries should also strive to offer positive verified development models not only for themselves, but also for others. At one time, the United States demonstrated the concept of a society of opportunity, while the Soviet Union championed the ideal of social justice. Likewise, Russia should uphold the principle of equal cooperation, including in the scientific field, and strive to be a beacon of stability and prosperity. This endeavor requires recognizing and

integrating the diverse development models, cultures and traditions of all peoples, building on scientific advances, and bringing a unique perspective to the global dialogue on progress and cooperation.